

SURGICAL INSTRUMENTATION AND METHOD FOR FORMING
A PASSAGE IN BONE HAVING AN ENLARGED CROSS-
SECTIONAL PORTION

Inventor: James L. Chappuis, et al.

App. No. New Atty Docket No. 4002-2923/PC664.00

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FIG. 1

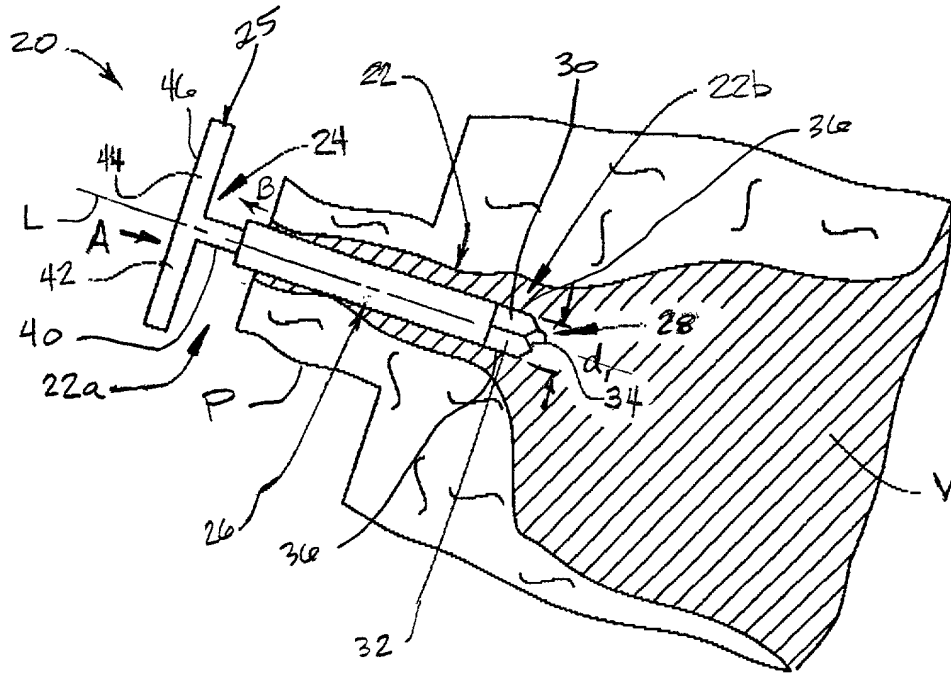
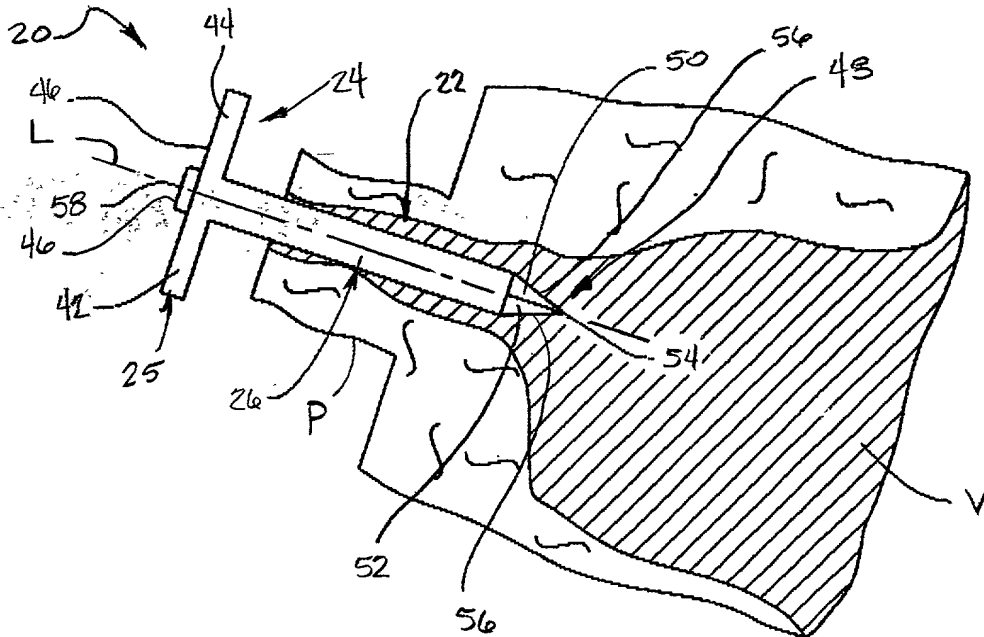


FIG. 3



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FIG. 4

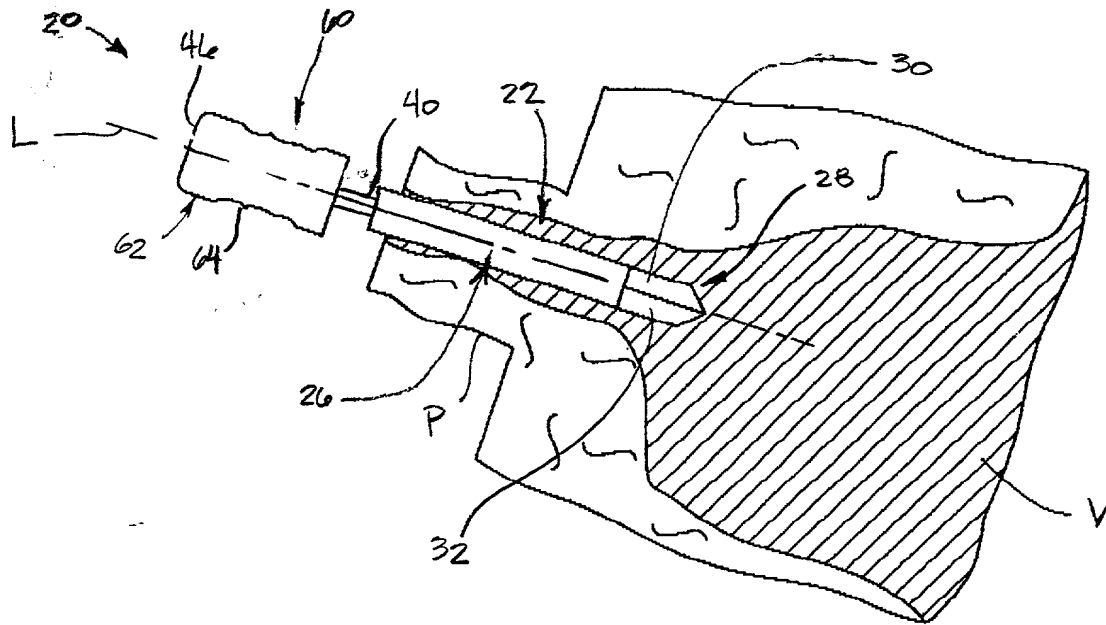
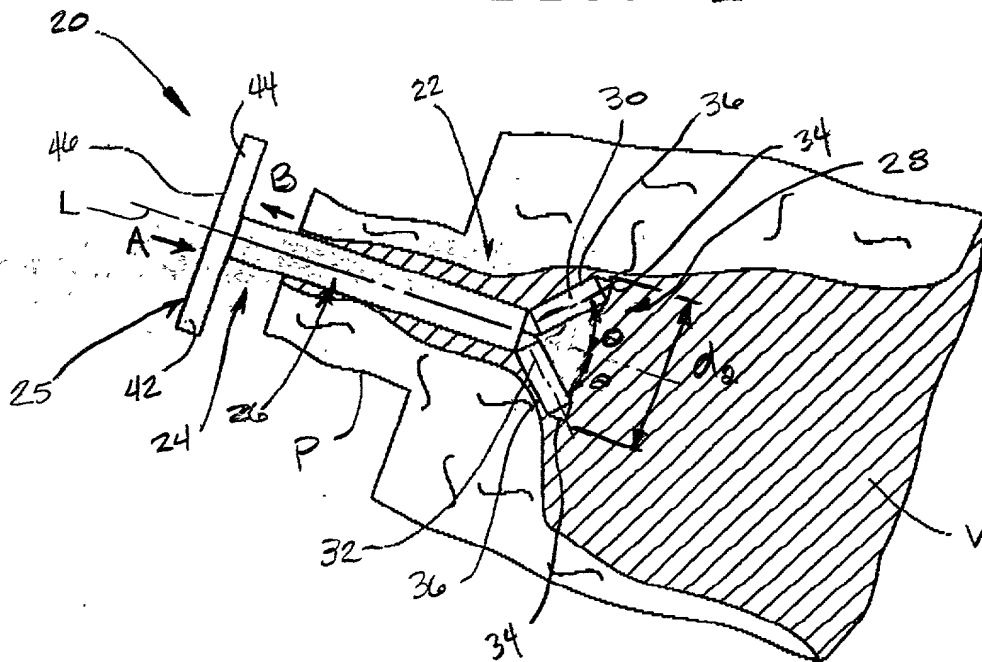


FIG. 2



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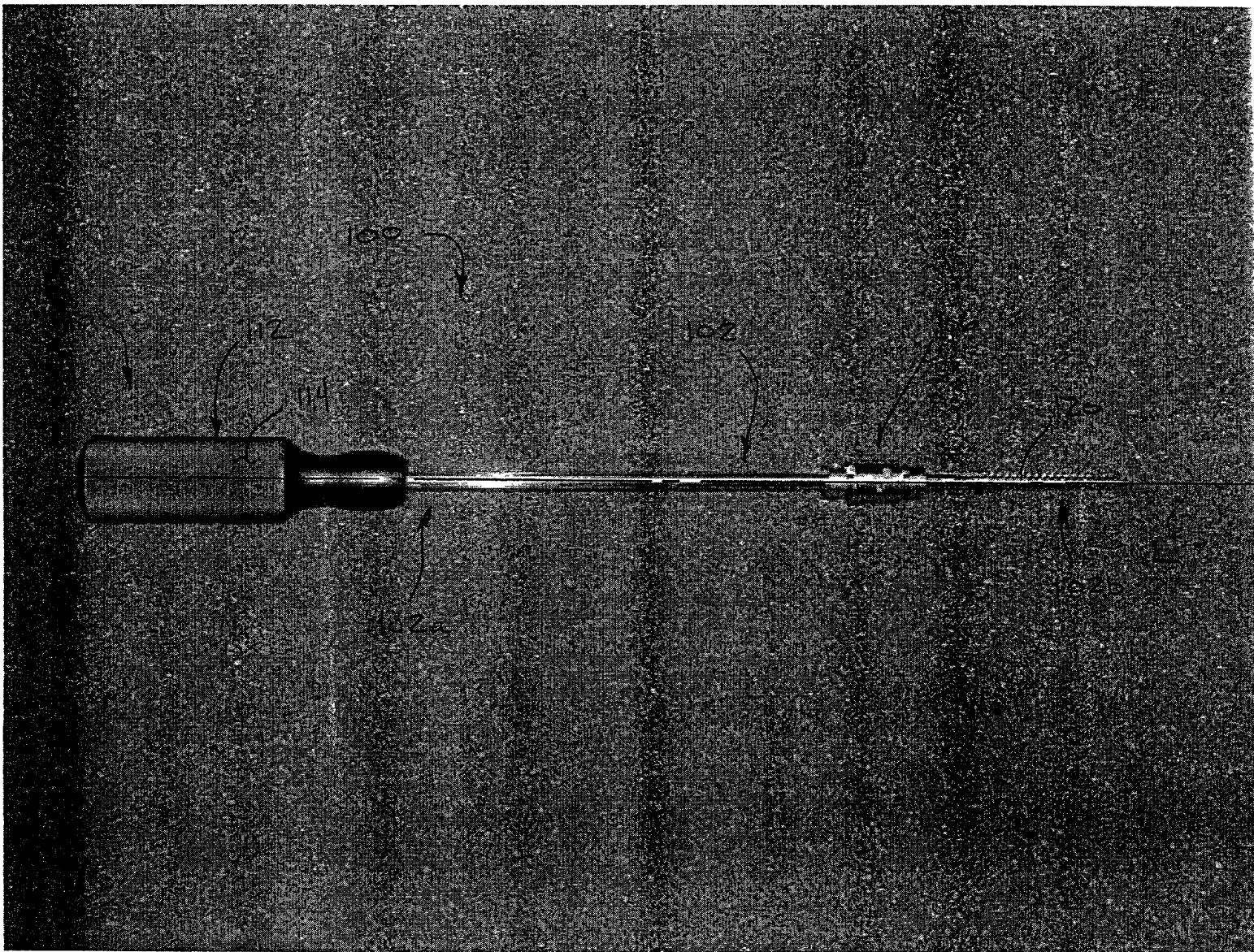


FIG. 5

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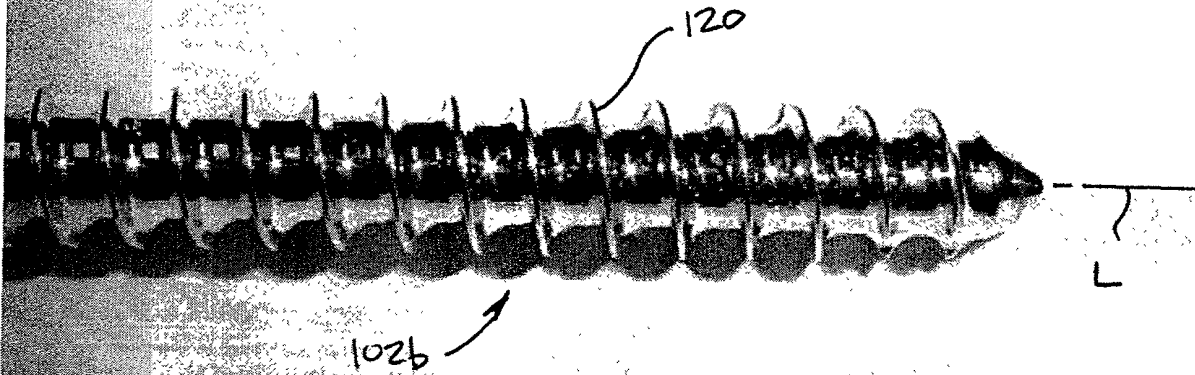


FIG. 6

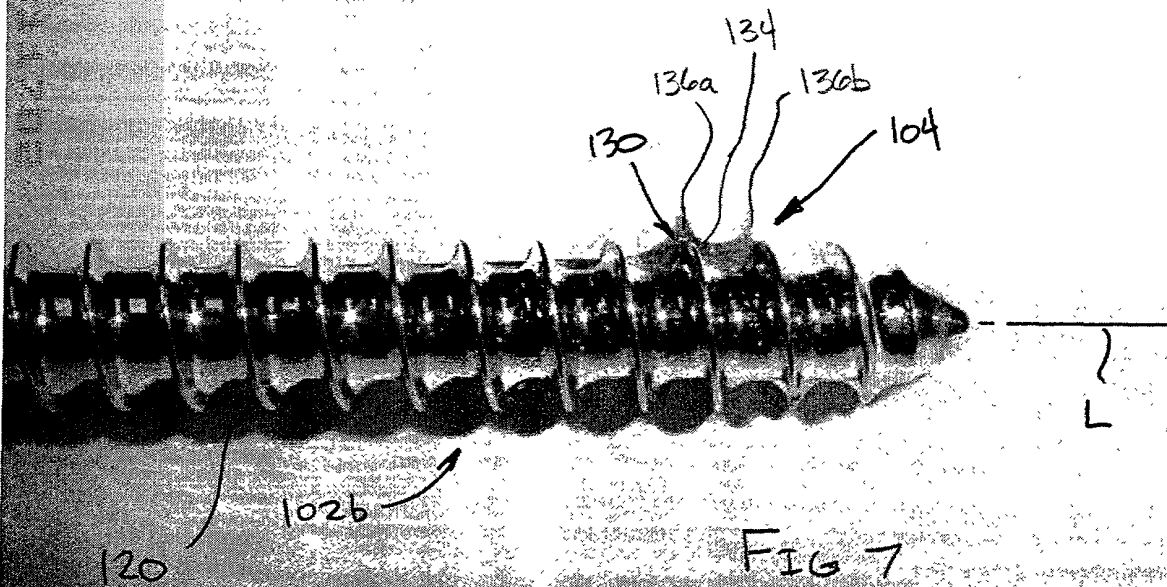


FIG. 7

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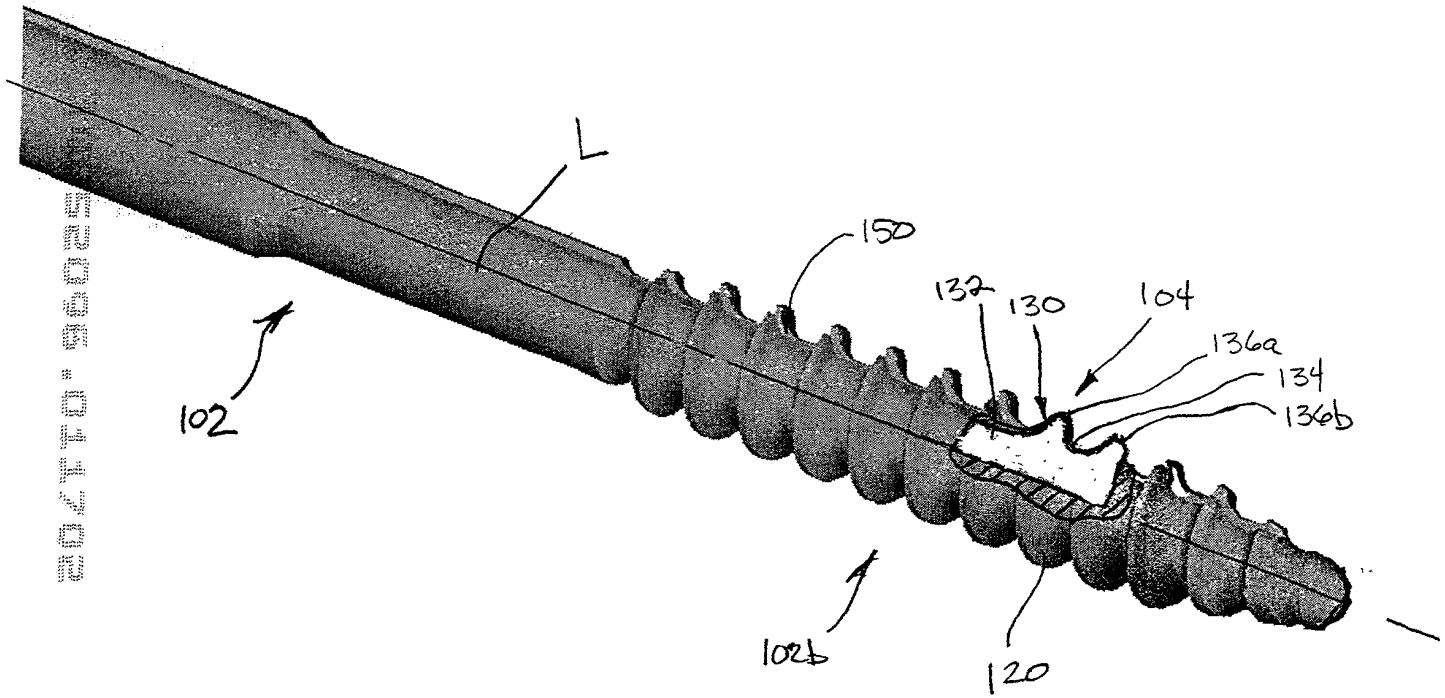


FIG. 8

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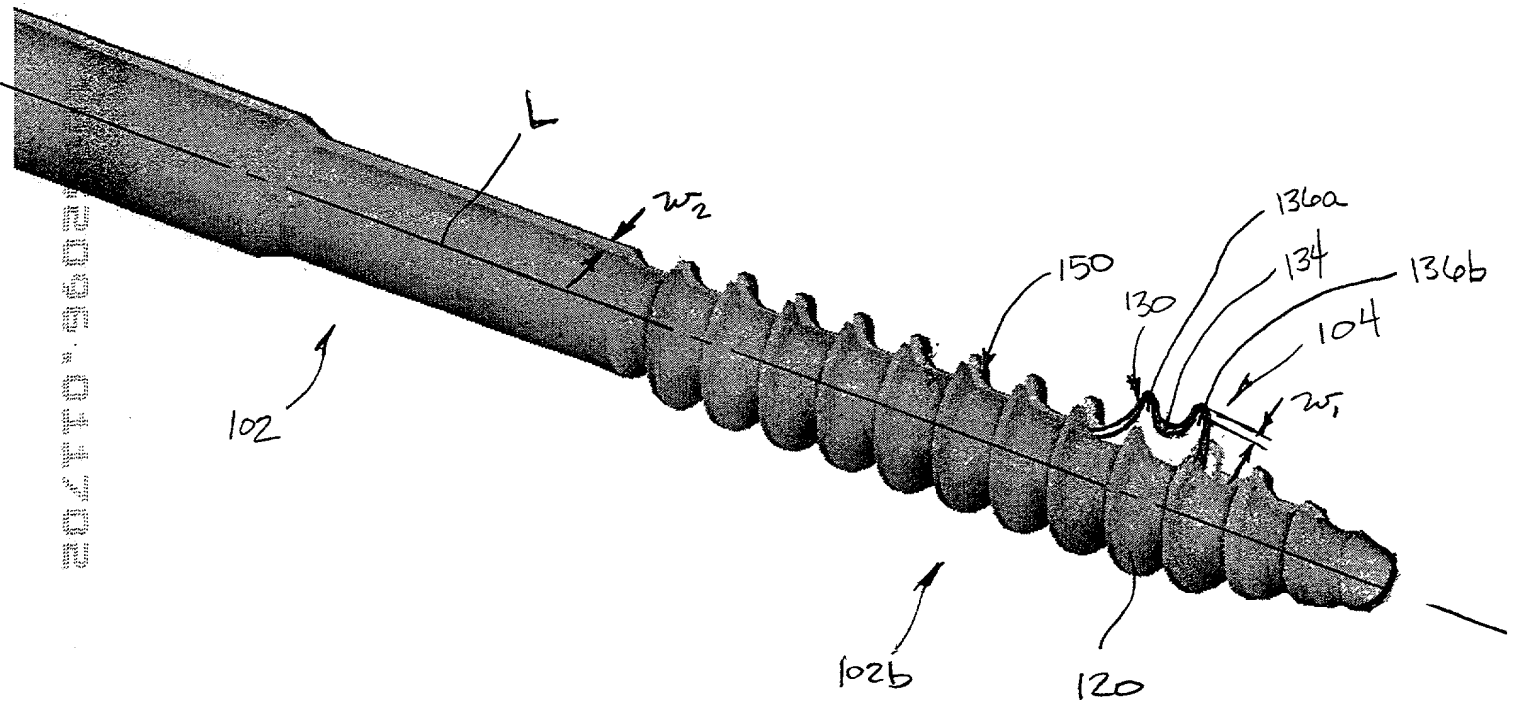


FIG. 9

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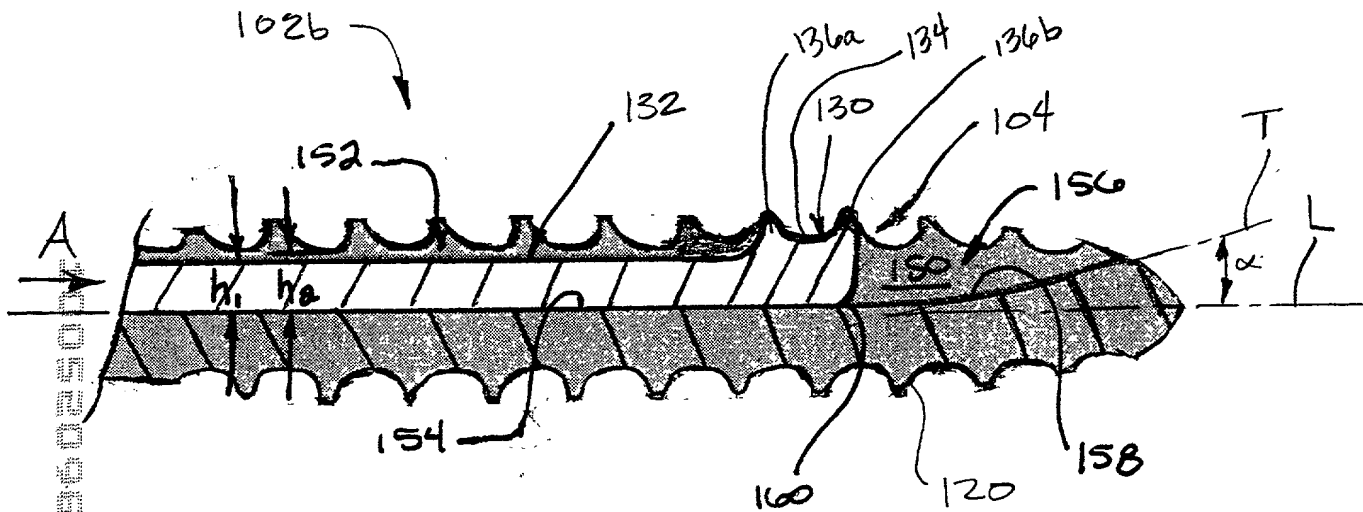


FIG. 10

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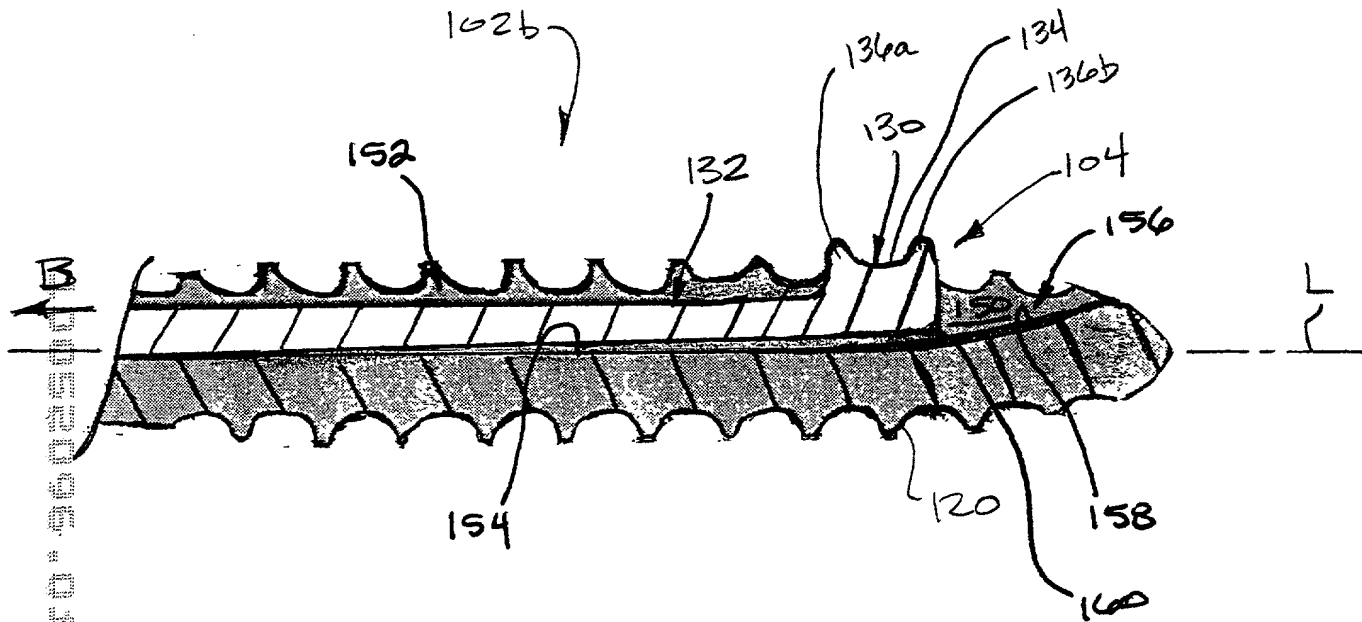


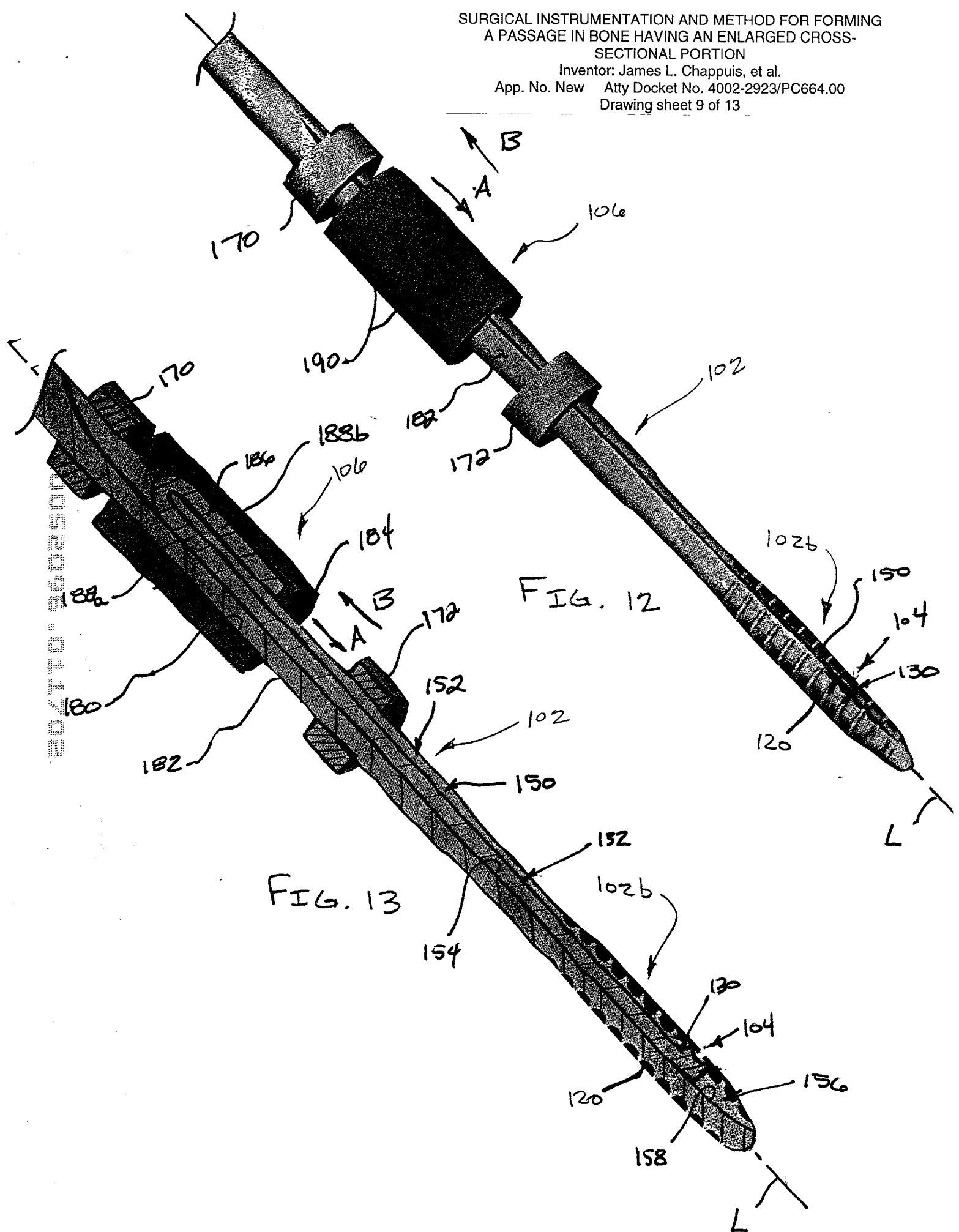
FIG. 11

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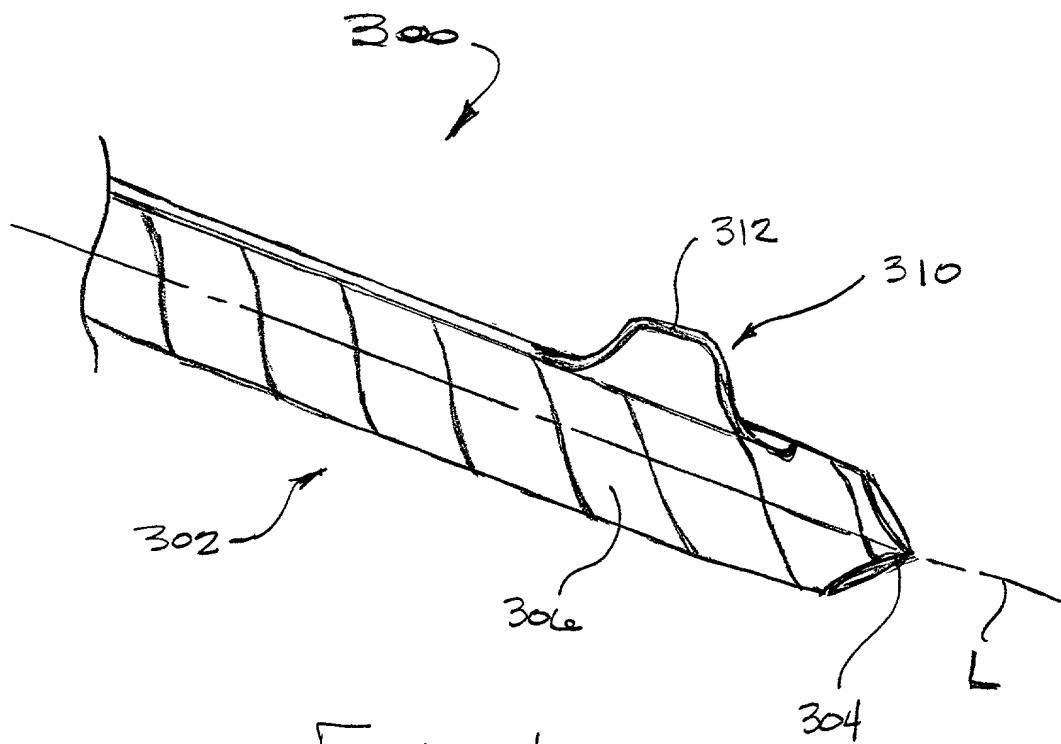
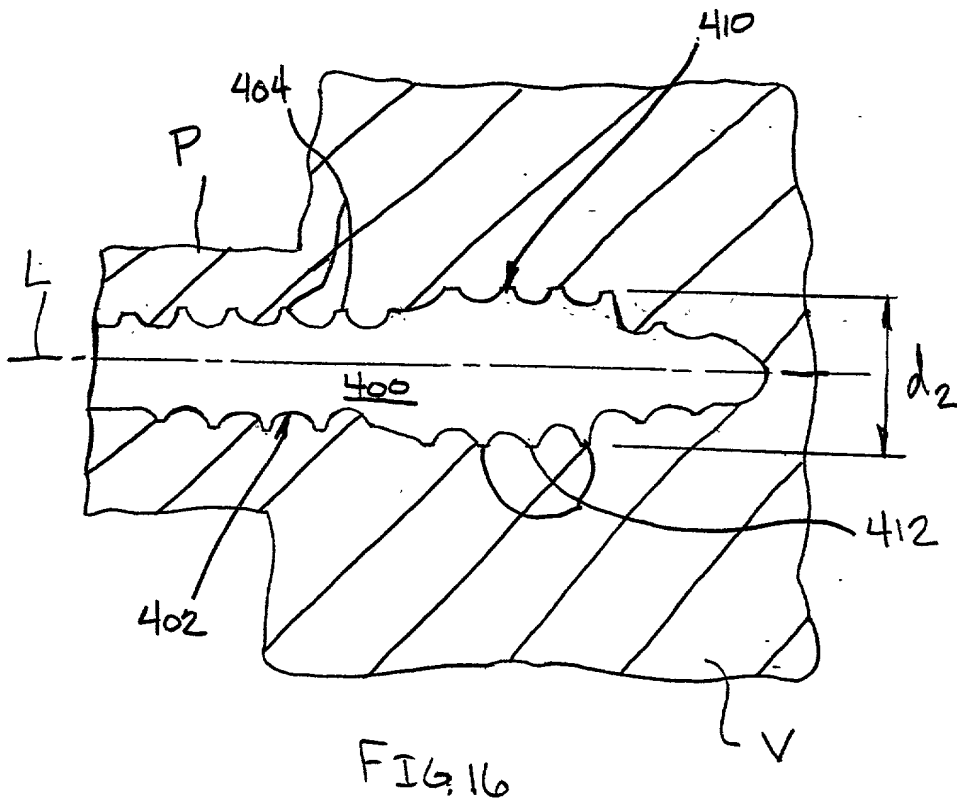


Figure 1 shows the results of the first two steps of the analysis. The first step, a principal component analysis, resulted in 10 principal components (PCs) that accounted for 85.3% of the variance in the data. The second step, a factor analysis, resulted in 10 factors that accounted for 85.3% of the variance in the data. The factors were labeled as follows: Factor 1: General Health; Factor 2: Mental Health; Factor 3: Physical Health; Factor 4: Social Health; Factor 5: Emotional Health; Factor 6: Cognitive Health; Factor 7: Behavioral Health; Factor 8: Environmental Health; Factor 9: Financial Health; and Factor 10: Spiritual Health. The results of the third step, a cluster analysis, are shown in Figure 2. The cluster analysis resulted in 10 clusters of items that were labeled as follows: Cluster 1: General Health; Cluster 2: Mental Health; Cluster 3: Physical Health; Cluster 4: Social Health; Cluster 5: Emotional Health; Cluster 6: Cognitive Health; Cluster 7: Behavioral Health; Cluster 8: Environmental Health; Cluster 9: Financial Health; and Cluster 10: Spiritual Health. The results of the fourth step, a discriminant analysis, are shown in Figure 3. The discriminant analysis resulted in 10 discriminant functions that were labeled as follows: Discriminant Function 1: General Health; Discriminant Function 2: Mental Health; Discriminant Function 3: Physical Health; Discriminant Function 4: Social Health; Discriminant Function 5: Emotional Health; Discriminant Function 6: Cognitive Health; Discriminant Function 7: Behavioral Health; Discriminant Function 8: Environmental Health; Discriminant Function 9: Financial Health; and Discriminant Function 10: Spiritual Health. The results of the fifth step, a regression analysis, are shown in Figure 4. The regression analysis resulted in 10 regression equations that were labeled as follows: Regression Equation 1: General Health; Regression Equation 2: Mental Health; Regression Equation 3: Physical Health; Regression Equation 4: Social Health; Regression Equation 5: Emotional Health; Regression Equation 6: Cognitive Health; Regression Equation 7: Behavioral Health; Regression Equation 8: Environmental Health; Regression Equation 9: Financial Health; and Regression Equation 10: Spiritual Health. The results of the sixth step, a correlation analysis, are shown in Figure 5. The correlation analysis resulted in 10 correlation coefficients that were labeled as follows: Correlation Coefficient 1: General Health; Correlation Coefficient 2: Mental Health; Correlation Coefficient 3: Physical Health; Correlation Coefficient 4: Social Health; Correlation Coefficient 5: Emotional Health; Correlation Coefficient 6: Cognitive Health; Correlation Coefficient 7: Behavioral Health; Correlation Coefficient 8: Environmental Health; Correlation Coefficient 9: Financial Health; and Correlation Coefficient 10: Spiritual Health. The results of the seventh step, a chi-square analysis, are shown in Figure 6. The chi-square analysis resulted in 10 chi-square statistics that were labeled as follows: Chi-Square Statistic 1: General Health; Chi-Square Statistic 2: Mental Health; Chi-Square Statistic 3: Physical Health; Chi-Square Statistic 4: Social Health; Chi-Square Statistic 5: Emotional Health; Chi-Square Statistic 6: Cognitive Health; Chi-Square Statistic 7: Behavioral Health; Chi-Square Statistic 8: Environmental Health; Chi-Square Statistic 9: Financial Health; and Chi-Square Statistic 10: Spiritual Health. The results of the eighth step, a t-test analysis, are shown in Figure 7. The t-test analysis resulted in 10 t-test statistics that were labeled as follows: T-Test Statistic 1: General Health; T-Test Statistic 2: Mental Health; T-Test Statistic 3: Physical Health; T-Test Statistic 4: Social Health; T-Test Statistic 5: Emotional Health; T-Test Statistic 6: Cognitive Health; T-Test Statistic 7: Behavioral Health; T-Test Statistic 8: Environmental Health; T-Test Statistic 9: Financial Health; and T-Test Statistic 10: Spiritual Health. The results of the ninth step, a z-test analysis, are shown in Figure 8. The z-test analysis resulted in 10 z-test statistics that were labeled as follows: Z-Test Statistic 1: General Health; Z-Test Statistic 2: Mental Health; Z-Test Statistic 3: Physical Health; Z-Test Statistic 4: Social Health; Z-Test Statistic 5: Emotional Health; Z-Test Statistic 6: Cognitive Health; Z-Test Statistic 7: Behavioral Health; Z-Test Statistic 8: Environmental Health; Z-Test Statistic 9: Financial Health; and Z-Test Statistic 10: Spiritual Health. The results of the tenth step, a Fisher's exact test analysis, are shown in Figure 9. The Fisher's exact test analysis resulted in 10 Fisher's exact test statistics that were labeled as follows: Fisher's Exact Test Statistic 1: General Health; Fisher's Exact Test Statistic 2: Mental Health; Fisher's Exact Test Statistic 3: Physical Health; Fisher's Exact Test Statistic 4: Social Health; Fisher's Exact Test Statistic 5: Emotional Health; Fisher's Exact Test Statistic 6: Cognitive Health; Fisher's Exact Test Statistic 7: Behavioral Health; Fisher's Exact Test Statistic 8: Environmental Health; Fisher's Exact Test Statistic 9: Financial Health; and Fisher's Exact Test Statistic 10: Spiritual Health. The results of the eleventh step, a binomial test analysis, are shown in Figure 10. The binomial test analysis resulted in 10 binomial test statistics that were labeled as follows: Binomial Test Statistic 1: General Health; Binomial Test Statistic 2: Mental Health; Binomial Test Statistic 3: Physical Health; Binomial Test Statistic 4: Social Health; Binomial Test Statistic 5: Emotional Health; Binomial Test Statistic 6: Cognitive Health; Binomial Test Statistic 7: Behavioral Health; Binomial Test Statistic 8: Environmental Health; Binomial Test Statistic 9: Financial Health; and Binomial Test Statistic 10: Spiritual Health. The results of the twelfth step, a sign test analysis, are shown in Figure 11. The sign test analysis resulted in 10 sign test statistics that were labeled as follows: Sign Test Statistic 1: General Health; Sign Test Statistic 2: Mental Health; Sign Test Statistic 3: Physical Health; Sign Test Statistic 4: Social Health; Sign Test Statistic 5: Emotional Health; Sign Test Statistic 6: Cognitive Health; Sign Test Statistic 7: Behavioral Health; Sign Test Statistic 8: Environmental Health; Sign Test Statistic 9: Financial Health; and Sign Test Statistic 10: Spiritual Health. The results of the thirteenth step, a rank-sum test analysis, are shown in Figure 12. The rank-sum test analysis resulted in 10 rank-sum test statistics that were labeled as follows: Rank-Sum Test Statistic 1: General Health; Rank-Sum Test Statistic 2: Mental Health; Rank-Sum Test Statistic 3: Physical Health; Rank-Sum Test Statistic 4: Social Health; Rank-Sum Test Statistic 5: Emotional Health; Rank-Sum Test Statistic 6: Cognitive Health; Rank-Sum Test Statistic 7: Behavioral Health; Rank-Sum Test Statistic 8: Environmental Health; Rank-Sum Test Statistic 9: Financial Health; and Rank-Sum Test Statistic 10: Spiritual Health. The results of the fourteenth step, a McNemar test analysis, are shown in Figure 13. The McNemar test analysis resulted in 10 McNemar test statistics that were labeled as follows: McNemar Test Statistic 1: General Health; McNemar Test Statistic 2: Mental Health; McNemar Test Statistic 3: Physical Health; McNemar Test Statistic 4: Social Health; McNemar Test Statistic 5: Emotional Health; McNemar Test Statistic 6: Cognitive Health; McNemar Test Statistic 7: Behavioral Health; McNemar Test Statistic 8: Environmental Health; McNemar Test Statistic 9: Financial Health; and McNemar Test Statistic 10: Spiritual Health. The results of the fifteenth step, a Cochran's Q test analysis, are shown in Figure 14. The Cochran's Q test analysis resulted in 10 Cochran's Q test statistics that were labeled as follows: Cochran's Q Test Statistic 1: General Health; Cochran's Q Test Statistic 2: Mental Health; Cochran's Q Test Statistic 3: Physical Health; Cochran's Q Test Statistic 4: Social Health; Cochran's Q Test Statistic 5: Emotional Health; Cochran's Q Test Statistic 6: Cognitive Health; Cochran's Q Test Statistic 7: Behavioral Health; Cochran's Q Test Statistic 8: Environmental Health; Cochran's Q Test Statistic 9: Financial Health; and Cochran's Q Test Statistic 10: Spiritual Health. The results of the sixteenth step, a Friedman test analysis, are shown in Figure 15. The Friedman test analysis resulted in 10 Friedman test statistics that were labeled as follows: Friedman Test Statistic 1: General Health; Friedman Test Statistic 2: Mental Health; Friedman Test Statistic 3: Physical Health; Friedman Test Statistic 4: Social Health; Friedman Test Statistic 5: Emotional Health; Friedman Test Statistic 6: Cognitive Health; Friedman Test Statistic 7: Behavioral Health; Friedman Test Statistic 8: Environmental Health; Friedman Test Statistic 9: Financial Health; and Friedman Test Statistic 10: Spiritual Health. The results of the seventeenth step, a Kruskal-Wallis test analysis, are shown in Figure 16. The Kruskal-Wallis test analysis resulted in 10 Kruskal-Wallis test statistics that were labeled as follows: Kruskal-Wallis Test Statistic 1: General Health; Kruskal-Wallis Test Statistic 2: Mental Health; Kruskal-Wallis Test Statistic 3: Physical Health; Kruskal-Wallis Test Statistic 4: Social Health; Kruskal-Wallis Test Statistic 5: Emotional Health; Kruskal-Wallis Test Statistic 6: Cognitive Health; Kruskal-Wallis Test Statistic 7: Behavioral Health; Kruskal-Wallis Test Statistic 8: Environmental Health; Kruskal-Wallis Test Statistic 9: Financial Health; and Kruskal-Wallis Test Statistic 10: Spiritual Health. The results of the eighteenth step, a Wilcoxon signed-rank test analysis, are shown in Figure 17. The Wilcoxon signed-rank test analysis resulted in 10 Wilcoxon signed-rank test statistics that were labeled as follows: Wilcoxon Signed-Rank Test Statistic 1: General Health; Wilcoxon Signed-Rank Test Statistic 2: Mental Health; Wilcoxon Signed-Rank Test Statistic 3: Physical Health; Wilcoxon Signed-Rank Test Statistic 4: Social Health; Wilcoxon Signed-Rank Test Statistic 5: Emotional Health; Wilcoxon Signed-Rank Test Statistic 6: Cognitive Health; Wilcoxon Signed-Rank Test Statistic 7: Behavioral Health; Wilcoxon Signed-Rank Test Statistic 8: Environmental Health; Wilcoxon Signed-Rank Test Statistic 9: Financial Health; and Wilcoxon Signed-Rank Test Statistic 10: Spiritual Health. The results of the nineteenth step, a Mann-Whitney U test analysis, are shown in Figure 18. The Mann-Whitney U test analysis resulted in 10 Mann-Whitney U test statistics that were labeled as follows: Mann-Whitney U Test Statistic 1: General Health; Mann-Whitney U Test Statistic 2: Mental Health; Mann-Whitney U Test Statistic 3: Physical Health; Mann-Whitney U Test Statistic 4: Social Health; Mann-Whitney U Test Statistic 5: Emotional Health; Mann-Whitney U Test Statistic 6: Cognitive Health; Mann-Whitney U Test Statistic 7: Behavioral Health; Mann-Whitney U Test Statistic 8: Environmental Health; Mann-Whitney U Test Statistic 9: Financial Health; and Mann-Whitney U Test Statistic 10: Spiritual Health. The results of the twentieth step, a Fisher's permutation test analysis, are shown in Figure 19. The Fisher's permutation test analysis resulted in 10 Fisher's permutation test statistics that were labeled as follows: Fisher's Permutation Test Statistic 1: General Health; Fisher's Permutation Test Statistic 2: Mental Health; Fisher's Permutation Test Statistic 3: Physical Health; Fisher's Permutation Test Statistic 4: Social Health; Fisher's Permutation Test Statistic 5: Emotional Health; Fisher's Permutation Test Statistic 6: Cognitive Health; Fisher's Permutation Test Statistic 7: Behavioral Health; Fisher's Permutation Test Statistic 8: Environmental Health; Fisher's Permutation Test Statistic 9: Financial Health; and Fisher's Permutation Test Statistic 10: Spiritual Health. The results of the twenty-first step, a bootstrap analysis, are shown in Figure 20. The bootstrap analysis resulted in 10 bootstrap statistics that were labeled as follows: Bootstrap Statistic 1: General Health; Bootstrap Statistic 2: Mental Health; Bootstrap Statistic 3: Physical Health; Bootstrap Statistic 4: Social Health; Bootstrap Statistic 5: Emotional Health; Bootstrap Statistic 6: Cognitive Health; Bootstrap Statistic 7: Behavioral Health; Bootstrap Statistic 8: Environmental Health; Bootstrap Statistic 9: Financial Health; and Bootstrap Statistic 10: Spiritual Health. The results of the twenty-second step, a jackknife analysis, are shown in Figure 21. The jackknife analysis resulted in 10 jackknife statistics that were labeled as follows: Jackknife Statistic 1: General Health; Jackknife Statistic 2: Mental Health; Jackknife Statistic 3: Physical Health; Jackknife Statistic 4: Social Health; Jackknife Statistic 5: Emotional Health; Jackknife Statistic 6: Cognitive Health; Jackknife Statistic 7: Behavioral Health; Jackknife Statistic 8: Environmental Health; Jackknife Statistic 9: Financial Health; and Jackknife Statistic 10: Spiritual Health. The results of the twenty-third step, a delete-d analysis, are shown in Figure 22. The delete-d analysis resulted in 10 delete-d statistics that were labeled as follows: Delete-d Statistic 1: General Health; Delete-d Statistic 2: Mental Health; Delete-d Statistic 3: Physical Health; Delete-d Statistic 4: Social Health; Delete-d Statistic 5: Emotional Health; Delete-d Statistic 6: Cognitive Health; Delete-d Statistic 7: Behavioral Health; Delete-d Statistic 8: Environmental Health; Delete-d Statistic 9: Financial Health; and Delete-d Statistic 10: Spiritual Health. The results of the twenty-fourth step, a cross-validation analysis, are shown in Figure 23. The cross-validation analysis resulted in 10 cross-validation statistics that were labeled as follows: Cross-Validation Statistic 1: General Health; Cross-Validation Statistic 2: Mental Health; Cross-Validation Statistic 3: Physical Health; Cross-Validation Statistic 4: Social Health; Cross-Validation Statistic 5: Emotional Health; Cross-Validation Statistic 6: Cognitive Health; Cross-Validation Statistic 7: Behavioral Health; Cross-Validation Statistic 8: Environmental Health; Cross-Validation Statistic 9: Financial Health; and Cross-Validation Statistic 10: Spiritual Health. The results of the twenty-fifth step, a sensitivity analysis, are shown in Figure 24. The sensitivity analysis resulted in 10 sensitivity statistics that were labeled as follows: Sensitivity Statistic 1: General Health; Sensitivity Statistic 2: Mental Health; Sensitivity Statistic 3: Physical Health; Sensitivity Statistic 4: Social Health; Sensitivity Statistic 5: Emotional Health; Sensitivity Statistic 6: Cognitive Health; Sensitivity Statistic 7: Behavioral Health; Sensitivity Statistic 8: Environmental Health; Sensitivity Statistic 9: Financial Health; and Sensitivity Statistic 10: Spiritual Health. The results of the twenty-sixth step, a specificity analysis, are shown in Figure 25. The specificity analysis resulted in 10 specificity statistics that were labeled as follows: Specificity Statistic 1: General Health; Specificity Statistic 2: Mental Health; Specificity Statistic 3: Physical Health; Specificity Statistic 4: Social Health; Specificity Statistic 5: Emotional Health; Specificity Statistic 6: Cognitive Health; Specificity Statistic 7: Behavioral Health; Specificity Statistic 8: Environmental Health; Specificity Statistic 9: Financial Health; and Specificity Statistic 10: Spiritual Health. The results of the twenty-seventh step, a positive predictive value analysis, are shown in Figure 26. The positive predictive value analysis resulted in 10 positive predictive value statistics that were labeled as follows: Positive Predictive Value Statistic 1: General Health; Positive Predictive Value Statistic 2: Mental Health; Positive Predictive Value Statistic 3: Physical Health; Positive Predictive Value Statistic 4: Social Health; Positive Predictive Value Statistic 5: Emotional Health; Positive Predictive Value Statistic 6: Cognitive Health; Positive Predictive Value Statistic 7: Behavioral Health; Positive Predictive Value Statistic 8: Environmental Health; Positive Predictive Value Statistic 9: Financial Health; and Positive Predictive Value Statistic 10: Spiritual Health. The results of the twenty-eighth step, a negative predictive value analysis, are shown in Figure 27. The negative predictive value analysis resulted in 10 negative predictive value statistics that were labeled as follows: Negative Predictive Value Statistic 1: General Health; Negative Predictive Value Statistic 2: Mental Health; Negative Predictive Value Statistic 3: Physical Health; Negative Predictive Value Statistic 4: Social Health; Negative Predictive Value Statistic 5: Emotional Health; Negative Predictive Value Statistic 6: Cognitive Health

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FIG. 15



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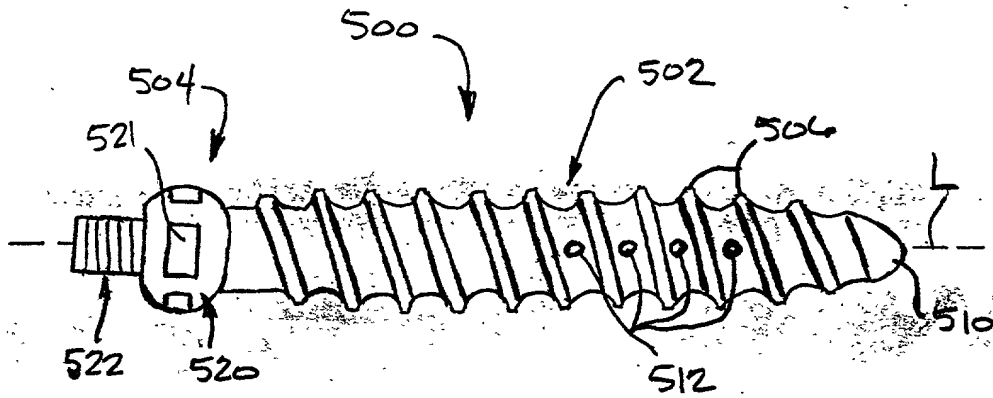


FIG. 17

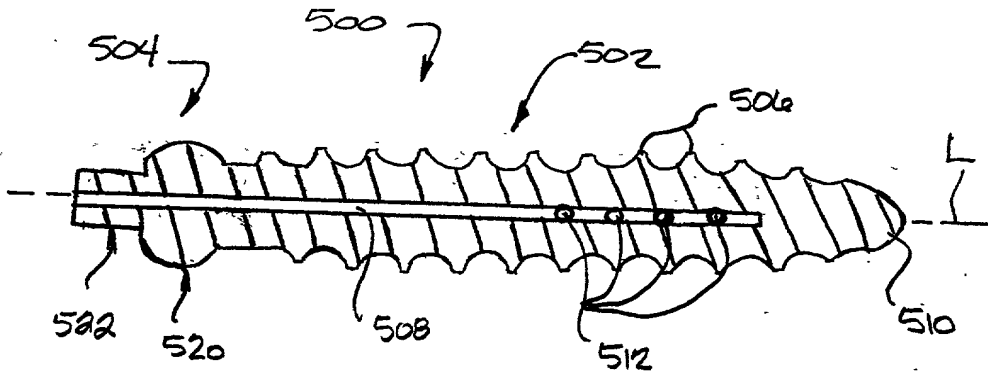


FIG. 18

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